

# Tulalip Business Park Sewage System Proposal

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8/15/01



# History of Project

- **Negotiations with City of Marysville for Handling Business Park Sewage**
- **Identify Other Options for Sewage**
  - Upgrade Existing Facility
  - Build New Treatment Facility Using the Same Oxidation Ditch Style System
  - Build New Treatment Facility Using New Membrane Biological Reactive System



# Project Goals

- **Provide Wastewater Treatment for Business Park by September 2002**
- **Create Wastewater Re-Use System**



# Description

- **Wastewater Facility Capable of Initially Handling 500,000 gpd Upgradeable to 4 mgd Sewage**
- **Treated Wastewater Re-Use System?**
  - Irrigation (Landscaping/Nursery)?
  - Fire Flows?
  - Fisheries Enhancement?
  - Fountain/Pond?
  - Toilets?
  - Other Ideas?



# Sources of Wastewater

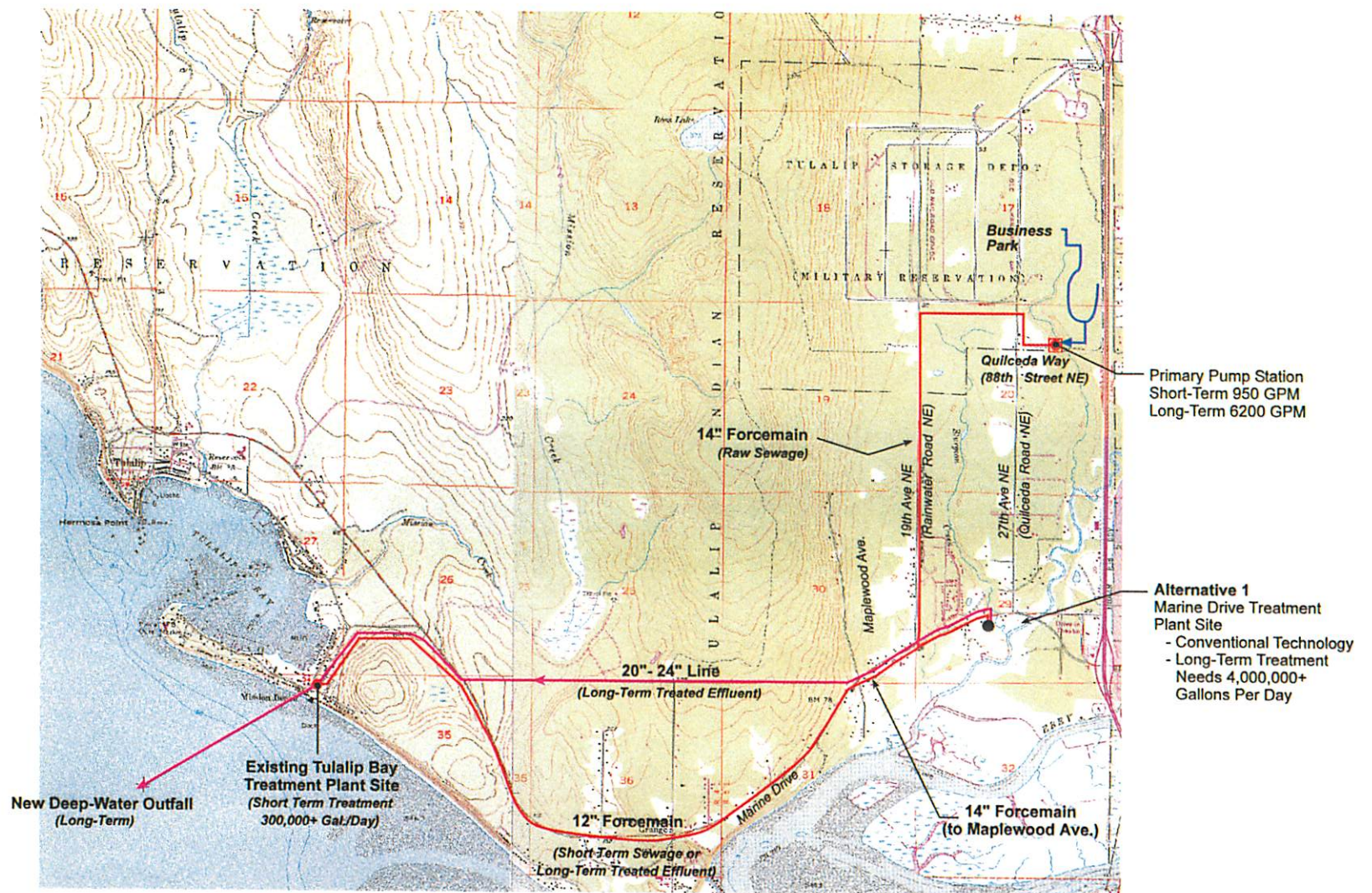
- Casino
- Convention Center
- Hotel
- Recreational Facilities
- Retail
- RV Park
- Initial flow < 500,000 gpd



# Treatment Alternatives

- **Marine Drive**
  - Marine Outfall & Conventional Technology
- **Tulalip Bay WWTP**
  - Marine Outfall & MBR Technology
- **Business Park**
  - Reuse of Effluent with MBR Technology





Parametrix Tulalip Tribes/216-1598-009/03(26) 5/01 (5)



Gravity  
 Force Main  
 Treated Effluent Line  
 Pump Station  
 Treatment Plant Site

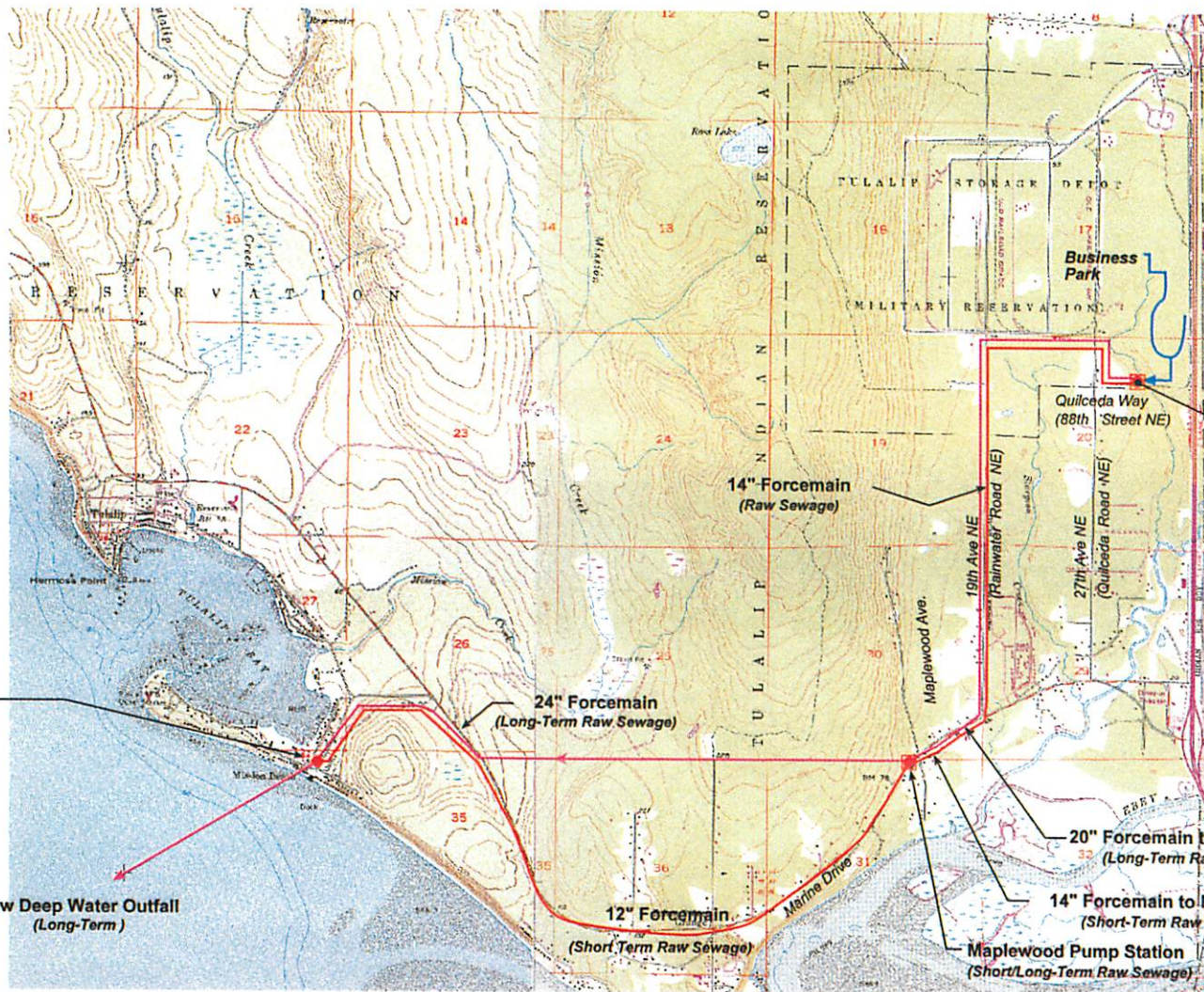
Figure 1  
Tulalip Tribes  
Wastewater Improvements

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**Alternative 2**  
Tulalip Bay Plant Site  
Membrane Technology  
- Short/Long-Term  
Treatment  
300,000 - 4,000,000  
Gallons Per Day

**New Deep Water Outfall  
(Long-Term)**



**Primary Pump Station**  
Short-Term 950 GPM  
Long-Term 6200 GPM

**14" Forcemain  
(Raw Sewage)**

**24" Forcemain  
(Long-Term Raw Sewage)**

**12" Forcemain  
(Short-Term Raw Sewage)**

**20" Forcemain to Maplewood  
(Long-Term Raw Sewage)**

**14" Forcemain to Maplewood  
(Short-Term Raw Sewage)**

**Maplewood Pump Station  
(Short/Long-Term Raw Sewage)**

Parametrix Tulalip Tribes/215-1598-009/03/26) 5/01 (5)



Gravity

Force Main  
(Raw Sewage)  
2nd Parallel Force Main  
(Raw Sewage)

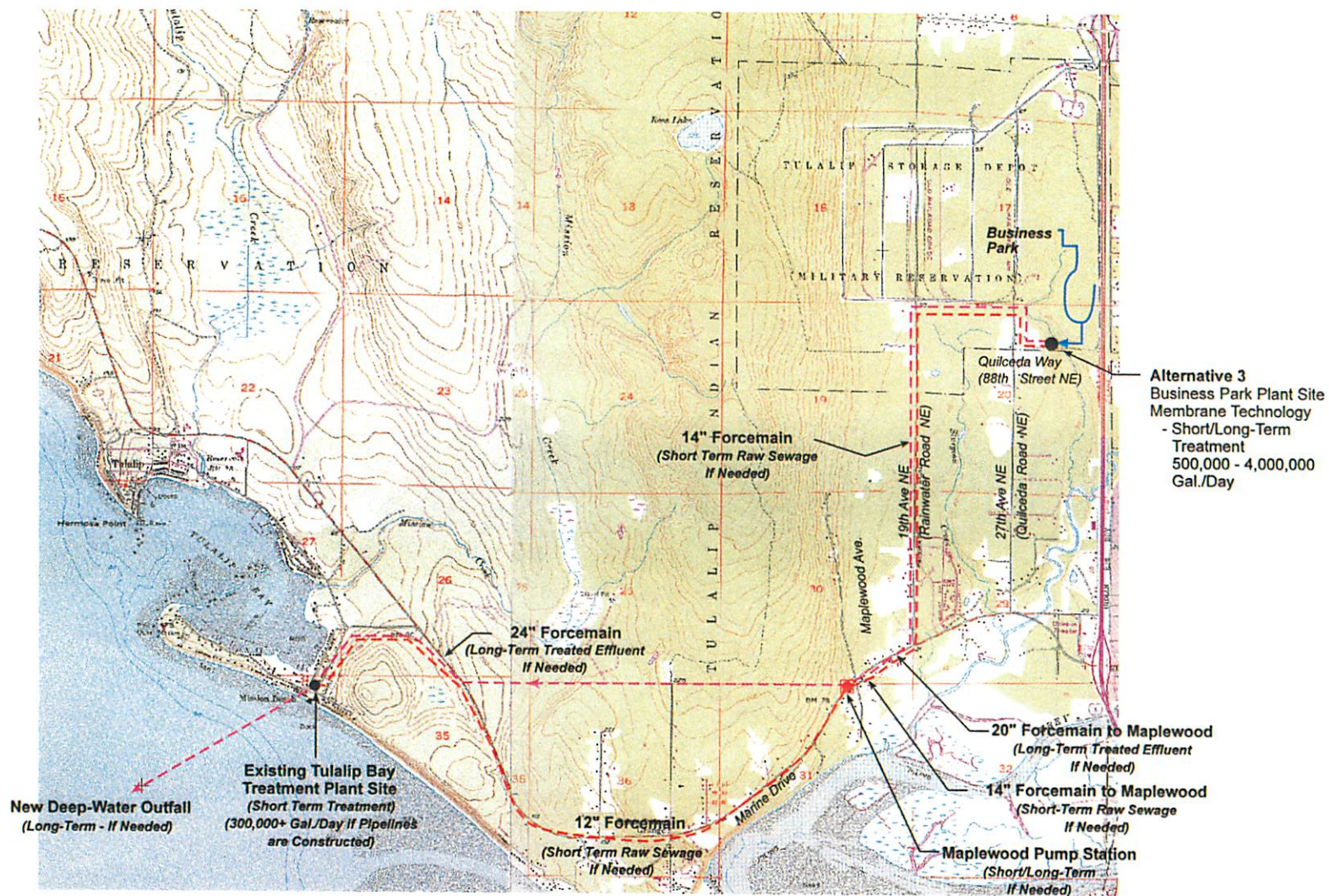
Pump Station

Treatment Plant Site

**Figure 2**  
**Tulalip Tribes**  
**Wastewater Improvements**

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— Gravity

--- Force Main If Needed

● Pump Station

--- 2nd Parallel Force Main If Needed

● Treatment Plant Site

**Figure 3**  
Tulalip Tribes  
Wastewater Improvements

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# MBR System

- **Uses Biological Process similar to Existing Treatment Plant**
- **Replaces Secondary Clarifier with Membrane Filtration in the Bioreactor**
- **Uses Higher Concentration of Mixed-Liquor Suspended Solids (MLSS)  
15,000 – 20,000 mg/l**



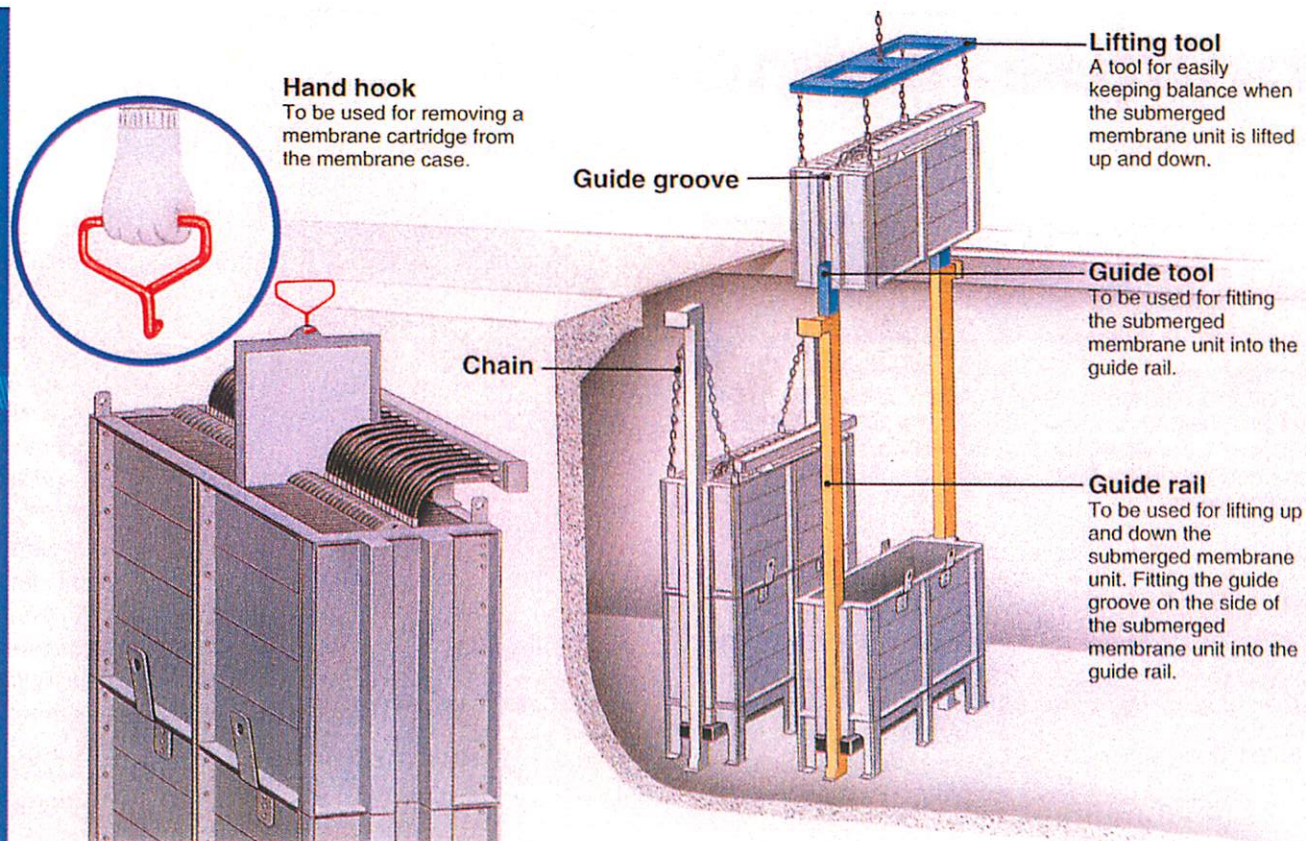
## Kubota Submerged Membrane Unit



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Kubota



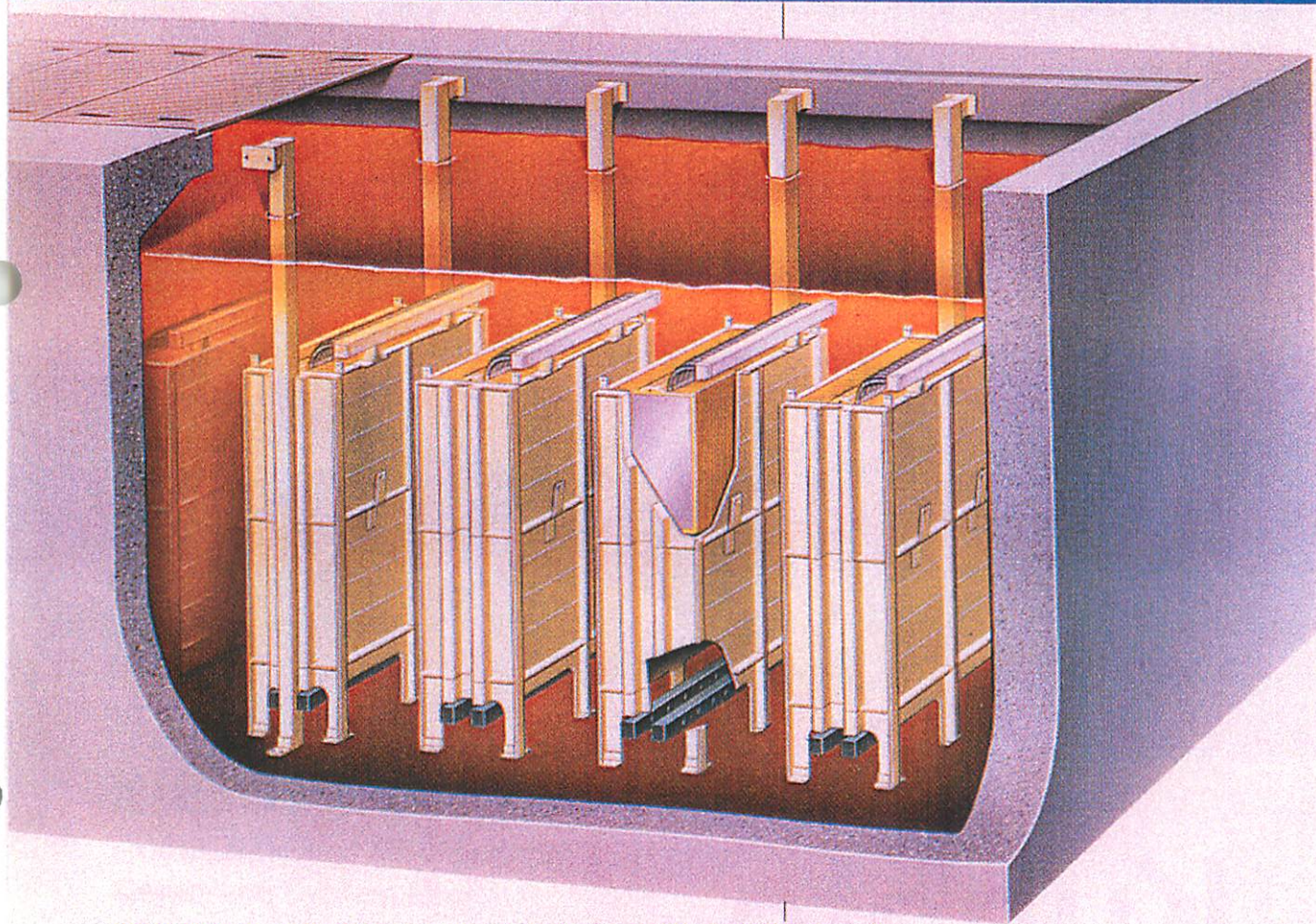


**Specifications of Submerged Membrane Unit**

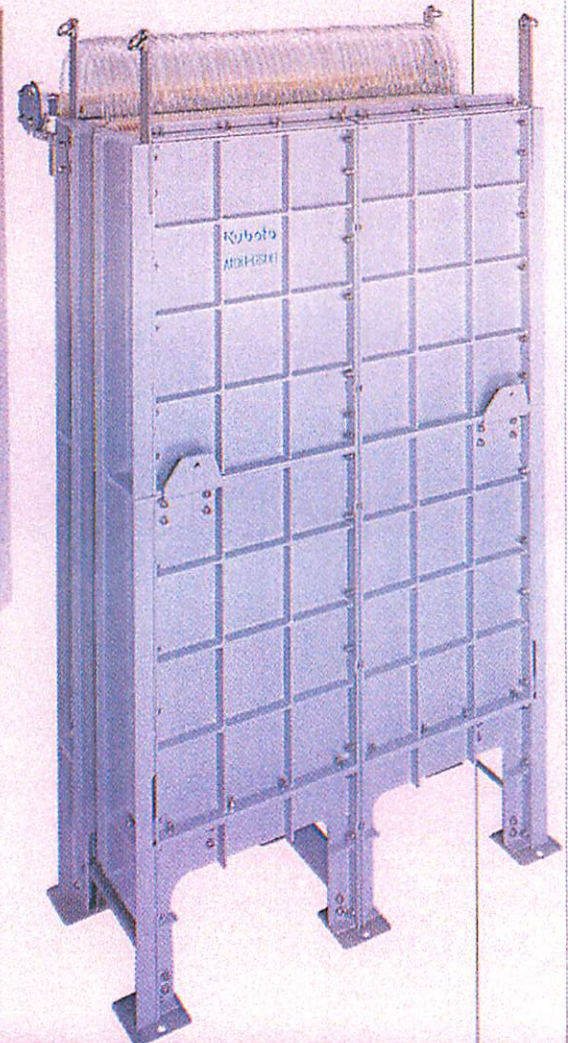
Type	Number of membrane cartridges	Type of membrane cartridge	Effective filtration area	Max. dimensions (W×D×H mm)	Weight of water contained (kg)
Type A	A50	Type 510	40	1100×880×2550	700
	A75		60	1450×880×2550	900
	A100		80	1800×880×2550	1150
	A125		100	2150×880×2550	1400
	A150		120	2500×880×2550	1600
Type E	E50	Type 510	40	1100×880×2040	650
	E75		60	1450×880×2040	850
	E100		80	1800×880×2040	1100
	E125		100	2150×880×2040	1350
	E150		120	2500×880×2040	1550
Type F	F50	Type 510	40	1100×880×1530	600

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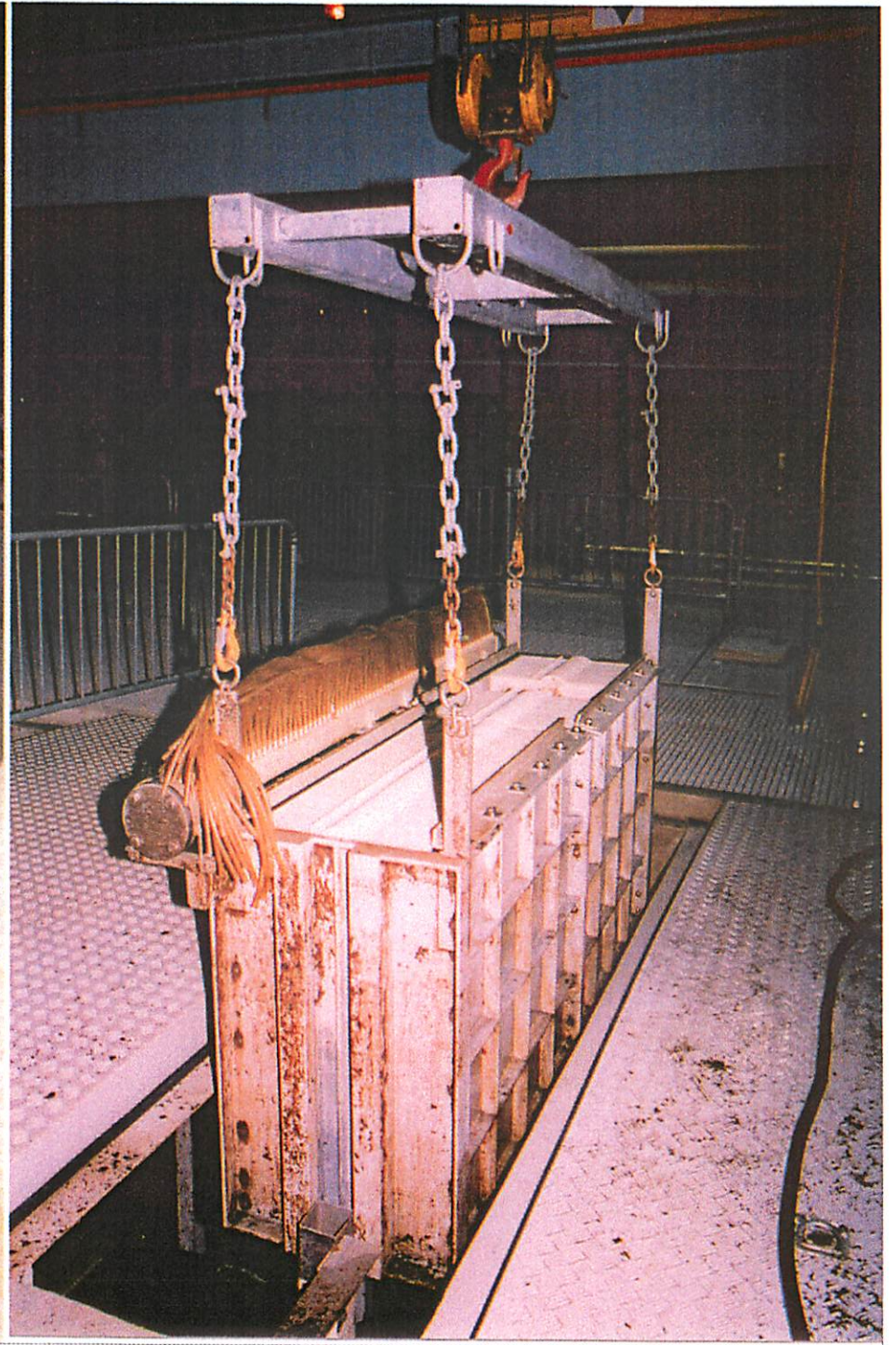




Installation example of submerged membrane unit, Type A











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# Screening & Grit Removal

- **Removal of Large Inorganic Debris**
- **Grit Removal System for Removal of Sand**
- **Kubota Recommends Dual Screening System to Prevent Debris from Damaging Membranes**
  - **6 mm Primary Screens**
  - **2 or 3 mm Secondary Screens**



# Disinfection Systems

- **Chlorination System**

- **Re-Use System**

- Irrigation (Landscaping/Nursery)?
    - Fire Flows?
    - Fountain/Pond?
    - Street Cleaning?
    - Toilets?
    - Other?

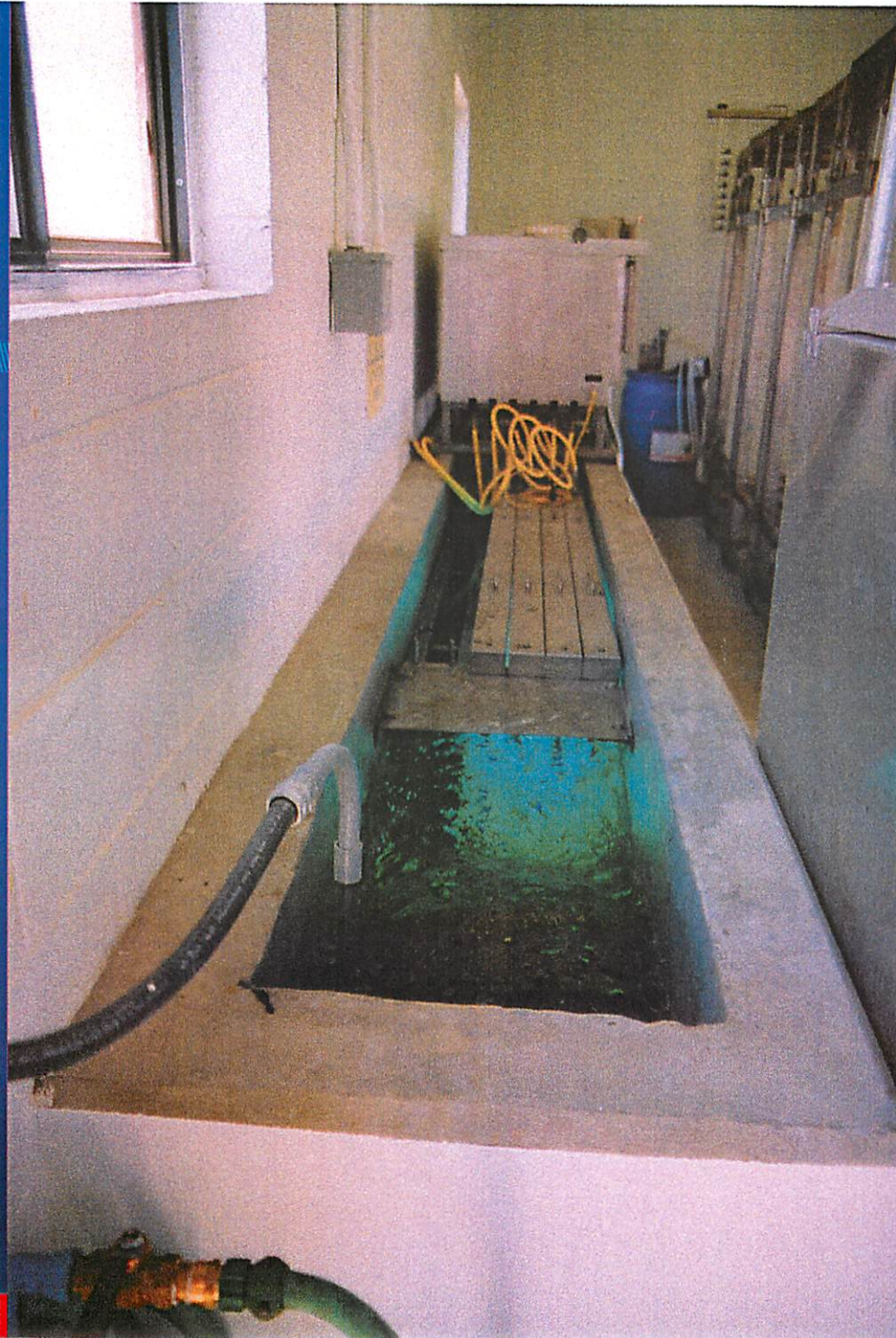
- **Potential human contact**



# Disinfection Systems

- **Ultra-Violet (UV) System**
  - **Fisheries Enhancement?**
    - Rearing Pond(s)?
    - Stream Flow Augmentation?
  - **Wetland Discharge?**
  - **Groundwater Injection?**





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STANDBY BLOWER S TO  
TANK 6 VALVE AV2804  
OPENED      CLOSED      AVAILABLE      LAMP  
YES!



MEMBRANE AERATION TANK No.5 FLOW FIT2204	SCREEN DIFFERENTIAL LEVEL LDT2408	MEMBRANE AERATION TANK No.5 LEVEL UT2406	MEMBRANE AERATION TANK No.5 FLOW FIT2205	SLUDGE RECYCLE TANK LEVEL UT2409	SLUDGE HOLDING TANK LEVEL UT2410
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0 - 50 l/s 14.3	0 - 2.13M 0.27	0 - 5.0M 3.19	0 - 50 l/s 13.4	0 - 5.0M 4.11	0 - 5.0M 4.44
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PERMEATE TANK TEMPERATURE T12100	DELIVERY PRESSURE PROSPECT FARM SLUDGE MAIN PIC2300	PERMEATE TANK DISSOLVED OXYGEN OICA2800	SLUDGE SUCTION MAN. SLUDGE DENSITY OICA2801	PERMEATE TANK TURBIDITY OICA2802
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0 - 25°C 18.1	0 - 7.0bar 0.00	0 - 10mg/l 0.05	0 - 10% 0.06	0 - 10ntu 0.44
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# Discharge Options

- **Deep Water Discharge**  
(Requires \$6,000,000 Pipeline)
- **Artificial Wetlands –**  
(Diffused inflow through sand filter)  
(Coho or Sturgeon Creeks)
- **Groundwater Injection**  
(Rapid Infiltration)
- **Re-Use Systems**

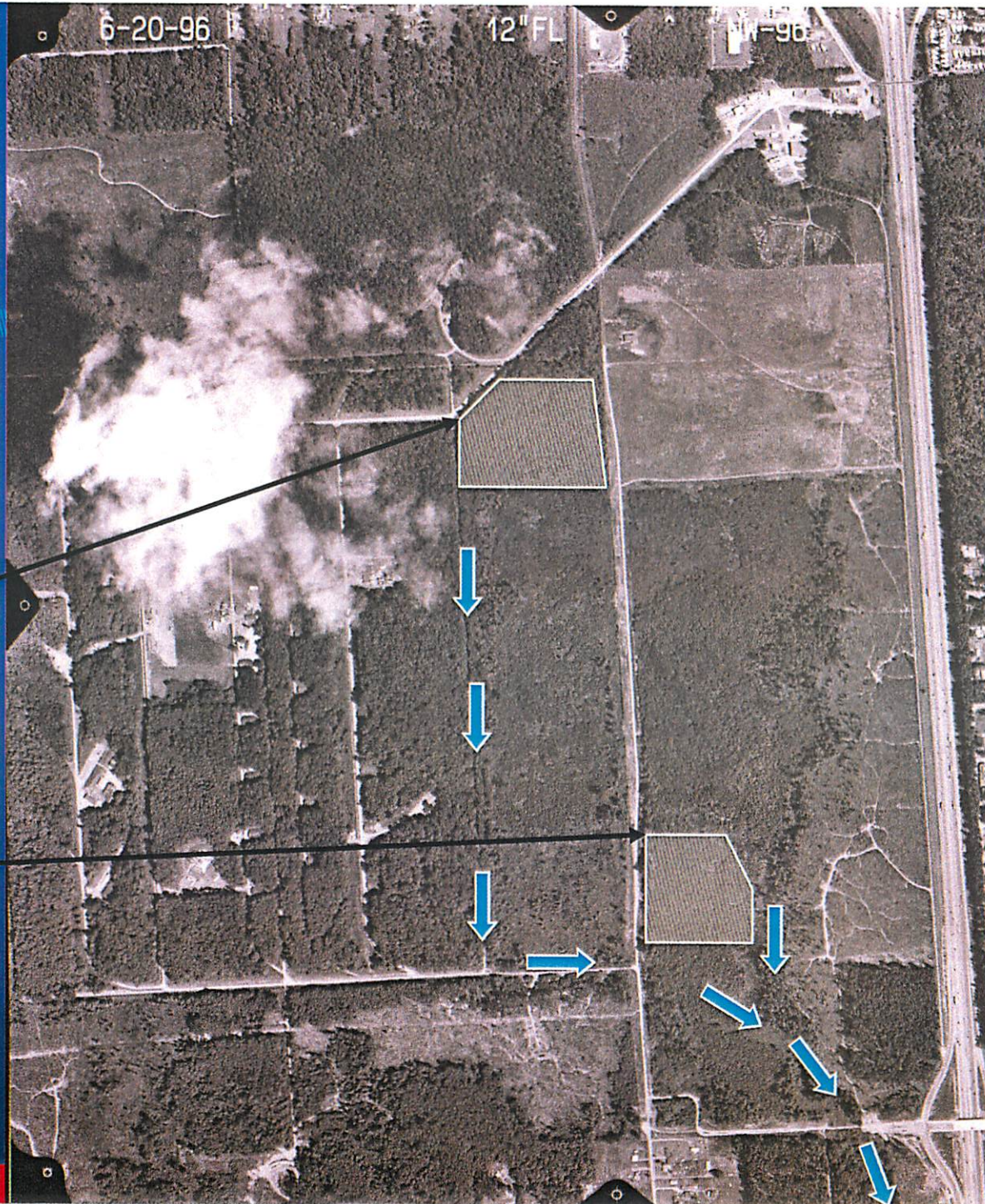


# Environmental Enhancement Locations

# UIC Wetland Augmentation Area

## Secondary UIC Area

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# Sands of Quil Ceda



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# Process for Selection

- **Consultant Recommendations (June 5)**
- **Staff Review (June 6 – July 13)**
- **Utilities Authority Review (July 10)**
- **Planning Commission Review (July 11)**
- **General Council Review (July 14)**
- **Retreat (July 16 & 17)**  
**(Board, Staff, Consultants)**
- **Initiate EPA Consultation (Aug. 16)**



# Comparison of Effluent Loadings

## Primary Treatment

● BOD	580 - 835 lbs/day
● TSS	210- 375 lbs/day
● Total Nitrogen	105 - 250 lbs/day
● Fecal	$10^3$ - $10^6$ / 100ml

*Based on 500,000 gpd*



# Comparison of Effluent Loadings

## Secondary Treatment

- BOD 125 lbs/day
- TSS 125 lbs/day
- Total Nitrogen 85 - 210 lbs/day
- Fecal 400 / 100ml

*Based on 500,000 gpd*



# Comparison of Effluent Loadings

## MBR with Denitrification

- BOD 17 lbs/day
- TSS 4 lbs/day
- Total Nitrogen 13 - 21 lbs/day
- Fecal 20 / 100ml

*Based on 500,000 gpd*



# Comparison of Equivalent Loads

## MBR with Denitrification

- BOD 40 homes
- TSS 25 homes
- Total Nitrogen 170 homes

*Based on 500,000 gpd*



# Conclusions

- **MBR Process Applicable for:**
  - Wetland Discharge (with aeration)
  - Fisheries Enhancement (with aeration)
  - Groundwater Discharge
  - Re-Use Systems
  - Regional Approach to groundwater usage



# Conclusions

- **Regional Issues:**
  - Surface water usage
  - Failing septic tanks
  - Satellite system potential